AMENDMENTS TO THE DRAWINGS

The attached sheet of new drawings includes Figs 14a-21. These sheets include previously omitted elements.

Attachment: 5 New Sheets

REMARKS/ARGUMENTS

Applicants have amended claims 7 and 11-14 as the Examiner suggested to cure the objection under 35 USC §112, second paragraph. Applicants are also submitting, without prejudice, terminal disclaimers to remove the obviousness type double patenting rejection (that rejection being clarified via an 8/12/05 telephone call with the Examiner such that applicants understand the double patenting rejection set forth beginning at the bottom of page 4 of the Office Action to relate to their U.S. patent application no. 10/923,076). Applicants are also submitting corrected formal drawings, and are rewriting certain additional claims into independent form. Applicants request reconsideration and allowance.

Applicants appreciate the Examiner's explicit indication that claims 15, 17, 18, 21, 23, 24, 29-30, 44-46 and 48-52 would be allowable if rewritten into independent form. Applicants further note that claims 8-10, 40-41 and 53-54 are not subject to any art rejection and therefore are also deemed to be allowable. To the extent, if any, that the Examiner's reasons for allowance are inconsistent with, add or omit claim limitations, applicants state that it is the combination of claimed elements as a whole that defines the scope of protection.

Applicants below address the prior art rejection of claims 1-7, 11-14, 16, 19, 20, 22, 25-28, 35-37, 42-43, 47, 60 and 61 ("rejected claims") in relation to Scherer et al (US Patent 6,711,200) and Wickham (US Patent 6,301,421) patents.

As with the previously applied Feisst patents, Scherer's patent is about Photonic Crystals and Photonic Band-Gap Materials, while applicants' illustrative exemplary non-limiting implementations are generally about arrays of independent waveguides. As was shown in previous communications with Examiner Kalivoda, in general the two entities (Photonic Bandgap Materials and waveguide arrays) are generally different (see previous comments with respect to Feisst).

Now addressing the Examiner's specific rejection with respect to claim 1:

> Scherer et al. teach a spectral filter for filtering or transmitting at least one predetermined spectral wavelength band comprising: a substrate or host wafer having first and second surface (Fig. 2, left and right side) and further including plural, substantially uniform parallel uncoupled waveguides defined at least partially therethrough (col 5, lines 43-48 and Fig 1, ref sign 10 and Fig 2, labeled waveguide)... (emphasis added)

First, Scherer does not teach filtering. The reference teaches "Tunable Photonic Crystal Lasers and a Method of Fabricating the Same".

Second, Fig. 2 left and right side are called "edges" of the wafer, not "surfaces." Surfaces are top (upper) and bottom (lower) sides of the wafer. These sides are by orders of magnitude, longer than "edges."

Third, applicants believe the Examiner has some misunderstanding of the Scherer et al. disclosure. Scherer employs a single waveguide, which is parallel to the surface of the wafer. The holes are perpendicular to the wafer and perpendicular to waveguide and have dimensions (both the hole dimensions and the distances between holes) that are

some multiple (roughly two times) smaller than one needs to confine the mode in it.

Original drawings from Scherer patent are shown below:

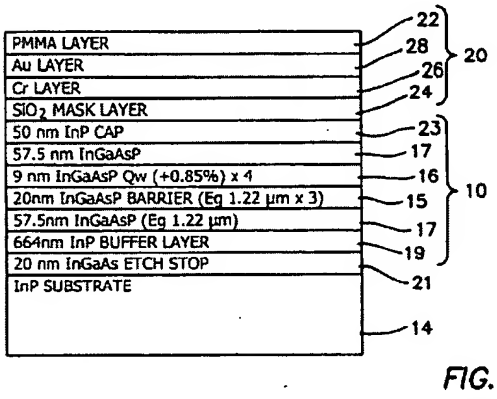


FIG. 1A

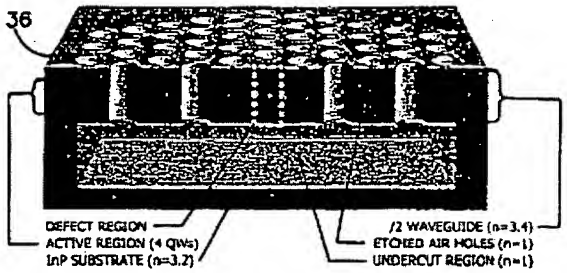
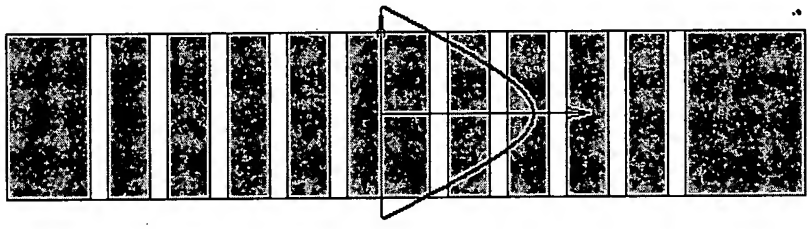


FIG. 2

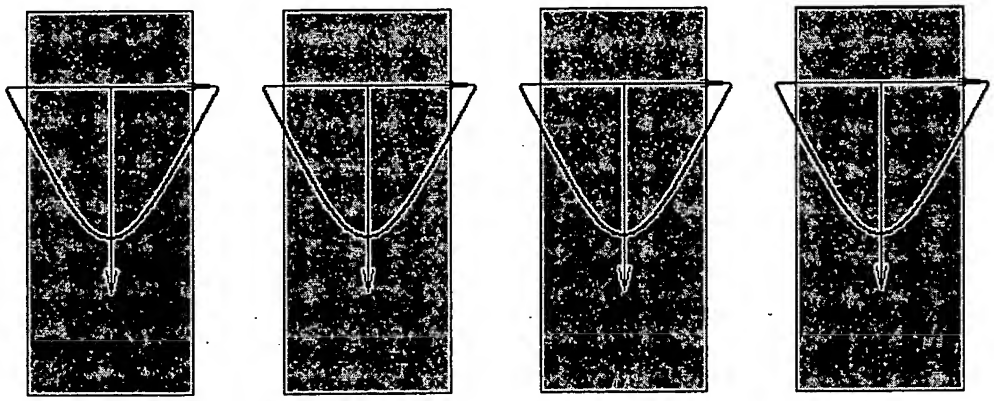
Figure 1. Original drawings from Scherer patent, referenced by Examiner Kalivoda.

The following shows the expected mode structure in Sherer's arrangement:



Sherer et al. case

The following shows the expected mode structure in applicants' exemplary illustrative non-limiting implementation:



Applicants' Case

Figure 2.

In the above illustrative drawings, the waveguide material is shown in gray color and the waveguide mode profile is shown schematically as curves.

The following passage from Scherer disclosure confirms that applicants' understanding of the Scherer patent is correct (col 2 lines 1-13):

> "The defect cavity is illustrated here utilizing a half wavelength thick high-index membrane to confine light vertically by way of total internal reflection [*the definition of waveguide*] similar to the design of a whispering gallery microdisk laser. The high index slab is then perforated with an hexagonal array of air holes, which Bragg reflects the light in plane. A defect is formed in the two-dimensional photonic lattice by removing an air hole and/or adjusting the diameters of the few neighboring air holes. A mode or set of modes depending on the defect geometry, which is highly localized to the defect region, is formed. Photons can escape from the defect cavity by tunneling through the two dimensional photonic crystal, or by leaking out vertically from the waveguide. (emphasis added)

In Scherer's case, there is a single waveguide in the form of membrane. Scherer does not describe plural, parallel or uncoupled waveguides.

The Examiner referenced the following Scherer passage: "A two dimensional photonic crystal in the horizontal plane of layer **16** can then be defined into waveguide **10** to form an optical microcavity **36**, and other waveguides (not shown) communicating with the photonic crystals in layer 16 can be used to connect adjacent optical devices (not shown)." He contends that this passage discloses that two different kinds of waveguides are mentioned. However, the waveguide 10 was already discussed above. The second "waveguides" are nothing more than fibers used for deliver and/or picking up the light from Scherer's laser. Since these waveguides are neither shown nor referenced in any

other way, there is no reason to discuss them further, especially since these waveguides do not play any relevant role in operation of Scherer's laser.

Examiner Kalivoda also stated the following with respect to Scherer:

> ... the plural waveguides defining axes substantially perpendicular to the wafer surface (Fig 2, ref waveguide which is horizontal and thus perpendicular to the left and right surfaces), the plural waveguides having coherently modulated cross sections along at least some part of the length of said waveguides (Fig 3 since holes are surrounding the waveguide), the plural waveguides supporting at least one waveguide mode at the predetermined spectral wavelength (col 7, lines 64-67).

However, as noted above, these are not left and right "surfaces," but left and right edges. And again, there is a single waveguide in Scherer's case. While it is certainly corrugated (by holes etched into it), it is a single waveguide, so applicants respectfully submit that the Examiner's argument is not valid. The thing in the middle of the structure, 32 in Scherer abbreviation is not waveguide -- it is a cavity.

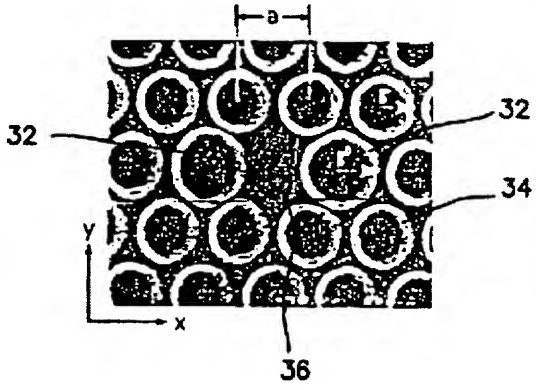


FIG. 3

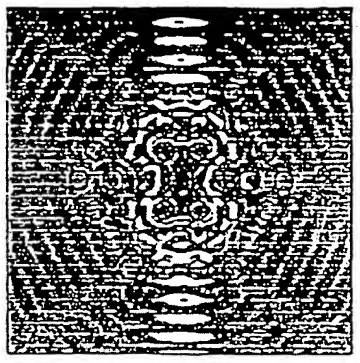


FIG. 5A

Figure 3. Left: Fig.3 from Scherer patent (illustrating the physical structure of the photonic cavity), right: Fig. 5 from Scherer illustrating the cavity mode.

A difference between applicants' exemplary illustrative non-limiting implementation and the Scherer case is not simply that the cavity is made for lasing (not for transmission and filtering the light); but also for light localization, as illustrated by Fig. 5a in Scherer et al patent and compare Figs. 5, 9c, 10b in applicants' patent applications. Applicants reproduce these figures below in Fig 3 (right) and Fig 4. In Scherer's case the cavity mode effectively extends into 3-4 hole layers, while in applicants' exemplary illustrative non-limiting implementation it is confined within a semiconductor island. The size of a photonic crystal "defect" (missing hole) in Scherer's patent is usually smaller than the mode volume, while in applicants' exemplary illustrative non-limiting implementation the waveguide mode is confined exactly by the semiconductor island surrounded by the holes. Another difference is that the cavity mode is confined in a horizontal direction (in wafer plane) by Bragg reflection in Scherer case, while in applicants' exemplary illustrative non-limiting implementation the waveguide mode is confined by total internal reflection in wafer plane. Accordingly, the Examiner's statement does not appear to be well grounded.

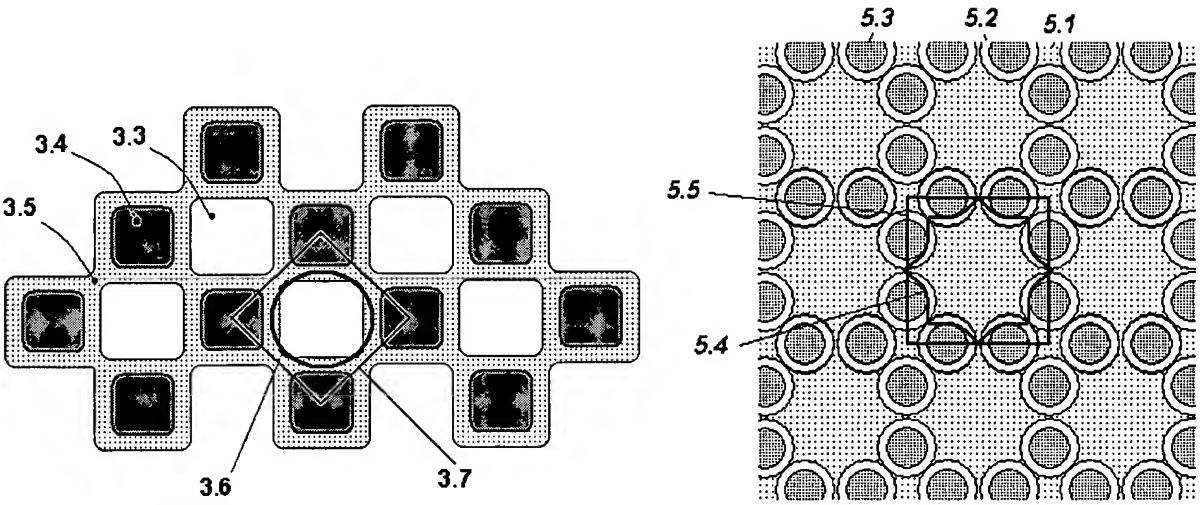


Figure 4. Schematic drawings illustrating the waveguide mode in different structures of applicants' disclosed exemplary illustrative implementation.

The Examiner also cited the following passage from Scherer et al patent:

> The guided modes of a symmetric perforated waveguide **10** can be classified simply as even or odd modes, pertaining to the mode symmetry about the horizontal mirror plane in the middle of the slab **10**.

Again, however, applicants comment exactly as provided above – which comments apply with equal force to this passage as well.

Applicants hope that their explanation will help to understand differences between applicants' exemplary illustrative non-limiting implementation and the Scherer patent -- and why the Examiner's rejection regarding claims 6, 16, 19, 20, 22, 60, 61, 2-3, 42-43, 47, 4-5, 7, 11-14, 25, 26, 27 and 28 is erroneous. This explanation should also overcome the arguments to claims 35-37, which were rejected by Examiner over Scherer in view of Wickham – since Wickham does not supply the missing teachings. Should the Examiner

believe that additional background or explanation would be helpful, applicants respectfully request a telephone interview.

All outstanding issues have been addressed and this application is in condition for allowance. Should any minor issues remain outstanding, the Examiner should contact the undersigned at the telephone number listed below so they can be resolved expeditiously without need of a further written action.

Respectfully submitted,

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